United States
Environmental Protection
Agency

National Risk Management
Research Laboratory
Research Triangle Park, NC 27711

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Project Summary

User's Guide to the Personal Computer Version of the Biogenic Emissions Inventory System (PC-BEIS2)

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The document is a user's guide for an updated Personal Computer version of the Biogenic Emissions Inventory System (PC-BEIS2) allowing users to estimate hourly emissions of biogenic volatile organic compounds (BVOCs) and soil nitrogen oxide emissions for any county in the contiguous United States. Emission rates depend on land use, emission factors, temperature and solar radiation. A simple canopy model is used to adjust photosynthetically active solar radiation at five vertical levels in the forest canopy. Leaf temperature and photosynthetically active solar radiation derived from ambient conditions above the forest canopy are then used to drive empirical equations to estimate genus level emission rates of BVOCs vertically through canopies. Emission rates from vegetation other than forests are expressed as BVOC carbon mass per unit land area, with a constant peak growing season biomass assumed. Light and temperature corrections are applied, but no canopy model is used for non-forested areas.

This Project Summary was developed by the National Risk Management Research Laboratory's Air Pollution Prevention and Control Division, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The Personal Computer version of the Biogenic Emissions Inventory System (PC-BEIS2) is an updated program that allows users to estimate hourly emissions of biogenic volatile organic compounds (BVOCs) and soil nitrogen oxide emissions for any county in the contiguous United States. PC-BEIS2 has been compiled using Microsoft FORTRAN and tested on IBM-compatible personal computers. The source code is written in ANSI FORTRAN 77 and should be transportable to most other computers. Emission rates depend on land use, emission factors, temperature, and solar radiation. A simple canopy model is used to adjust photosynthetically active solar radiation at five vertical levels in the forest canopy. Leaf temperature and photosynthetically active solar radiation derived from ambient conditions above the forest canopy are then used to drive empirical equations to estimate genus level emission rates of BVOCs vertically through canopies. Emission rates from vegetation other than forests are expressed as BVOC carbon mass per unit land area, with a constant peak growing season biomass assumed. Light and temperature corrections are applied, but no canopy model is used for non-forested areas.

Data Requirements

The data requirements for PC-BEIS2 are modest. The user needs to obtain information on the county of interest and hourly meteorological data. County land use data and normalized emission factors are already contained in the model. The land use file is compressed on the diskette and must be "unzipped" using the program PKUNZIP. To run PC-BEIS2, the user should obtain the following data:

Site information:

- County Federal Information Processing System (FIPS) code - an index of

FIPS codes can be retrieved from the same directory as the PC-BEIS2 system

- Latitude, longitude (decimal degrees, tenths) - centered in the county, used for solar radiation calculations
- Time zone (5=EST, 6=CST, etc.)
- Month, day, year, hour(s)

Meteorological data (hourly):

- Ambient air temperature (°C)
- Photosynthetically Active Radiation (PAR) - not required if using cloud cover data
- Opaque sky cover (fraction) - not required if providing PAR data

Computer Aspects

Computer aspects include installation procedures, machine requirements, software design, and data structures associated with PC-BEIS2.

Installation Procedures

The executable file, source code, and necessary data files are available on EPA's CHIEF (Clearinghouse for Inventories and Emission Factors) electronic bulletin board or via ftp at "ttnbbs.rtpnc.epa.gov." The access number for CHIEF is 919/541-5742. To install the program, simply follow the procedures given on the bulletin board.

Model Requirements

PC-BEIS2 is written to conform with the FORTRAN 77 standard and has been compiled on the PC with Microsoft FORTRAN version 5.0. The source code, however, should be easily adapted to most FORTRAN compilers. PC-BEIS2 has been compiled to allow its use on IBM-compatible personal computers. The current executable version does not require the use of a math co-processor.

The executable, source code, and necessary data files needed to run PC-BEIS2 will take up approximately 3.16 MB of memory. In order for the menu interface to function properly, ANSI.SYS must be installed on the PC. ANSI.SYS is available with MS-DOS. The DOS reference book contains instructions. It is recommended, but not required, that PC-BEIS2 users have a math co-processor.

Software Design

PC-BEIS2 has been written in a modular fashion and, to the extent possible, conforms to the ANSI FORTRAN 77 standard. It consists of a main program and six subroutines or functions.

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The complete report, entitled "User's Guide to the Personal Computer Version of the Biogenic Emissions Inventory System (PC-BEIS2)," (Order No. PB95-243184; Cost: $17.50, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650
The EPA Project Officer can be contacted at:
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